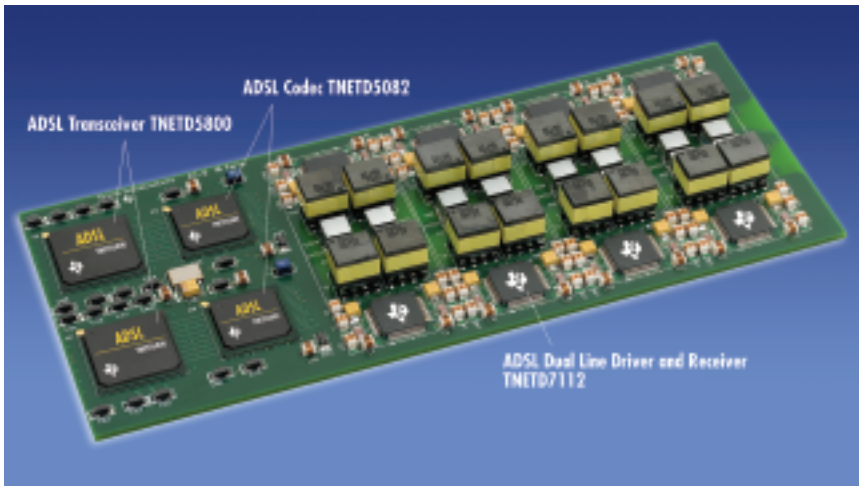
Product Bulletin

AC6 ADSL Infrastructure Chipset



AC6 supports all worldwide ADSL standards and offers performance-based interoperability to meet Category-1, Category-2 and TR-048 requirements.

Key Features:

- Highest channel density ADSL infrastructure chipset enabling more subscribers per line card
- Lowest power solution of 950 mW/port (peak power)
- Leverages design integration at chipset RBOM, AFE and system levels
- Utilizes loop adaptive power management to intelligently optimize power on every loop
- In-band management protocol eliminates need for local processor
- Open software ADSL platform enabling customer-specific functionality
- Based on field-hardened, fifth-generation ADSL technology
- Utilizes high-efficiency, multiple-output plug-in power modules

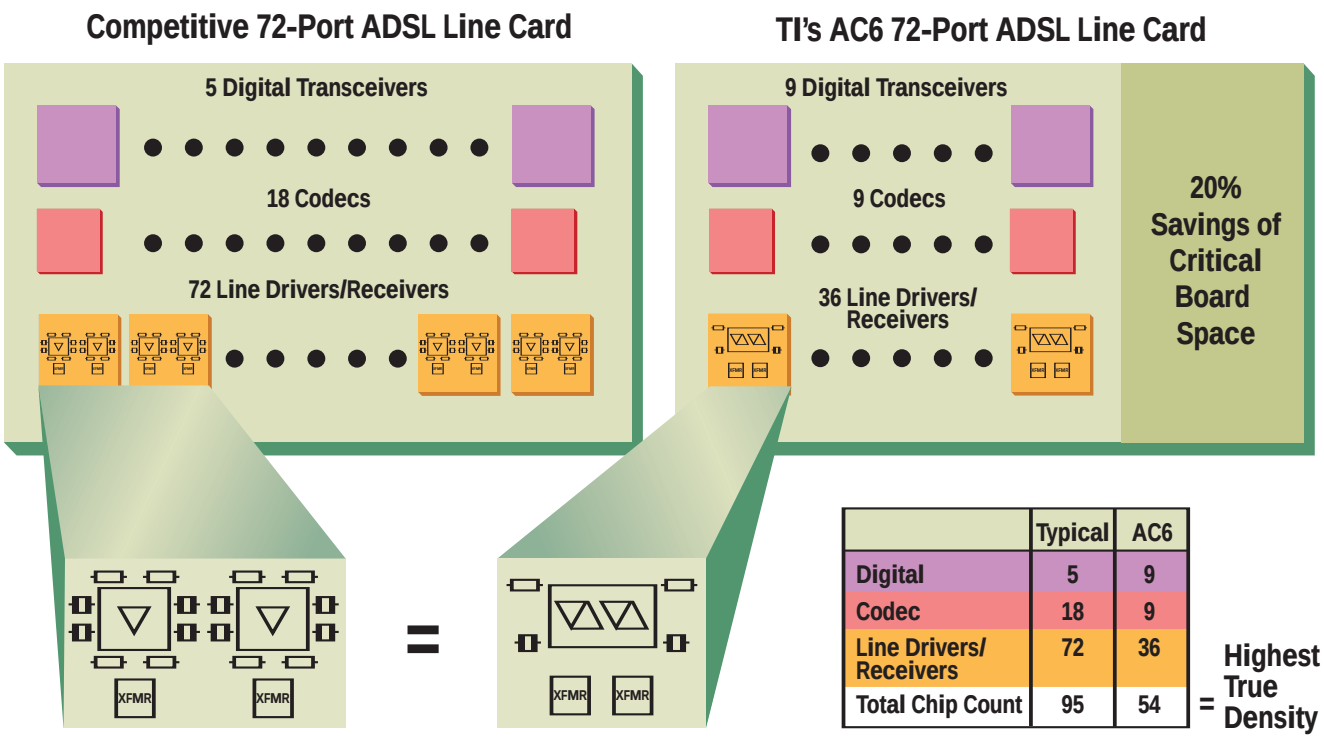
With a focus on chipset integration and advanced power management techniques, the new AC6 ADSL infrastructure platform from Texas Instruments (TI) redefines system power, density and cost—the driving factors for next-generation DSL central office (CO) platforms. The AC6 is a three-chip solution that includes an octal digital transceiver, a highly integrated octal codec and dual-line drivers/receivers.

The first in a family of DSL infrastructure products, AC6 will be available in varying port-count implementations for DSLAM, DLC, ONU and integrated voice and data (IVD) applications, delivering world-class dependability, deployability and performance.

The chipset builds on TI's five previous generations of field-proven, highly interoperable ADSL CO chipsets and delivers the industry's highest channel density of 1.1 square inch per port as well as the lowest power per channel of 950 mW peak power.

These metrics are important not only from a chipset standpoint, but also from a system-level perspective. By shrinking core DSL functions and integrating control and network layer functionality historically implemented in separate chips or cards, the AC6 significantly increases the amount of space available for ADSL lines. Therefore, by making more subscriber lines available, AC6 will allow both equipment manufacturers and service providers to generate more revenue and boost ROI. Additionally, this high-level of chipset integration is the springboard from which designers can build optimized systems with improved line density, greatly reduced power requirements and lower total system cost.

At the system level, power management techniques are crucial to achieving profitably deployed DSL infrastructure systems. The AC6 utilizes a set of advanced power management techniques that intelligently monitor and maintain required power levels for every



AC6 provides the industry's highest "true" density against 16-port configuration competitive offerings. True density is defined as the combination of total number of channels the chipset supports, the power-consumption of the board and the board area per port.

loop in the system. By employing loop adaptive power management capabilities, AC6 dynamically adjusts power for each channel in the system, taking into account loop length and desired data throughput. This differentiates AC6 from today's competing solutions, which maintain peak power for every channel, thereby neglecting important power savings.

Integration: The Foundation for System Success

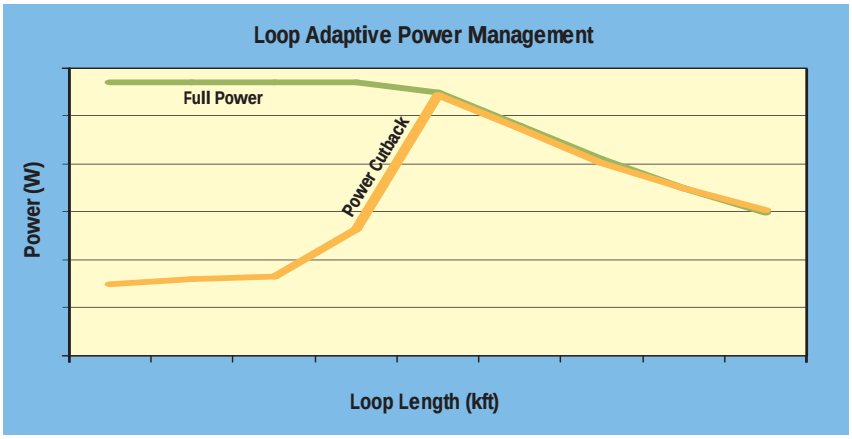
Manufacturers and operators alike require increasingly denser line cards. By taking advantage of in-house expertise in digital, analog and power management design, TI has addressed density by focusing attention on integration at the analog front end (AFE), system and rest of bill of materials (RBOM) levels.

Since the AFE comprises a large percentage of the board area, TI evaluated it first for power reductions. AC6's new AFE brings into the chipset many of the hybrid components previously implemented on the board discretely—cutting in half the number of components required around the AFE, resulting in an RBOM cost reduction of 40-percent for the chipset functionality alone.

From a system perspective, a line card consists not only of the ADSL physical layer, but also the control and power management portions of the board. Therefore, the control portion, which also occupies significant board space, was an integration target as well. With AC6, TI eliminates the need for the host processor by providing in-band management functionality, which provides control of management information through the Utopia II interface. The in-band feature further eliminates external implementation of a significant portion of the card's control circuitry. This equates to total system cost savings of approximately $40 per line card.

Advanced Power Management: Breaking the Power Barrier

In any DSL infrastructure system, power is the ultimate barrier. A system's power budget defines the number of DSL lines that



AC6's loop adaptive feature allows you to control power based on varying throughput at different loop lengths. Service providers can now optimize every system or line card at certain data rates or power budgets.

designers can implement in any one system. System density, in-turn, indicates how cost effective the system will be for OEMs to build, service providers to operate and ultimately consumers to access. The AC6 is designed with advanced power management features that maximize the system's power budget.

Loop Adaptive Power Management

Any given DSL line's power requirements are determined by the loop length, at a maximum of 18K feet, and the desired data throughput. Statistically, it would be rare for every line in the system be terminated at the maximum distance. Even more rare would be every loop in the system requiring maximum data throughput at the same time. Therefore, competitive solutions that provide peak power at all times to each loop are consuming unnecessary power.

This feature allows loop adaptive dynamic power cutback from the peak of 950 mW at all times for every line in the system, depending on loop length and required data throughput. It also eliminates unneeded power consumption, allowing for additional lines through more efficient use of the fixed power budget.

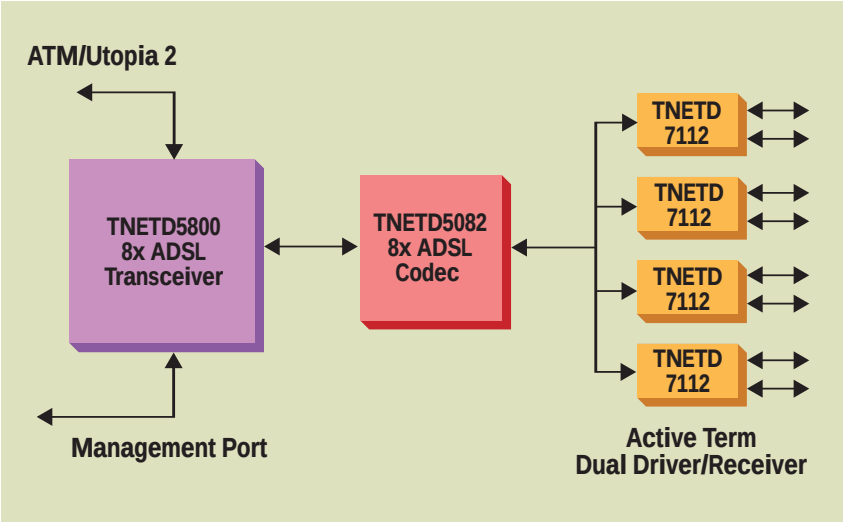
Customized Plug-in Power Solutions

In addition to the power saving techniques provided in the AC6 itself, TI offers a complete line of customized plug-in power supply modules designed to maximize the power efficiencies of varying systems of varying port count configurations. The integrated plug-in power modules are optimized for 32-or-fewer and 64-or-fewer port card configurations.

Interoperability and Standards Compliance

As a world-leading ADSL technology supplier, TI is focused on interoperability and compliance with all international standards. TI's CO chipsets are interoperable with both new and field-deployed CPE products from Alcatel, Globespan, Centillium, Analog Devices and ITEX.

TI maintains a dedicated DSL interoperability lab conducting rigorous testing to meet ongoing interoperability requirements with DSL modems from other vendors worldwide. TI is an active participant in industry-sponsored interoperability events such as the DSL Forum as well as University of New Hampshire PlugFests.



The three-chip AC6 includes an octal transceiver, codec and dual-line drivers.

In addition, TI is working with leading service providers and operators around the world, like Korea Telecom, China Telecom, Chunghua Telecom in Asia, Deutsche Telcom, British Telecom, Telcom Italia, France Telecom in Europe and Bell South, SBC, Qwest, AT&T in the U.S., to ensure the interoperability of all TI ADSL products.

The three-chip AC6 chipset features full compliance with all ADSL/POTS and ADSL/ISDN standards, including ITU G992.1 (Annex A), G992.2, G.994.1 and ANSI T1.413i2.

The chipset consists of:

- TNETD5800 octal digital transceiver
- TNETD5082 octal codec
- TNETD7112 dual-line driver/receiver.

Development Support

The AC6 is a complete solution that comes packaged with an evaluation board, reference design, full hardware (HDK) and software design kits (SDK) and software. A partial list of each kits deliverables:

HDK

- Hardware design manual
- Application notes on technology issues
- Datasheets
- Core schematics in OrCAD™ and PDF
- Layout example in PowerPCB™, Gerber™, and PDF files
- Example splitter design (Annex A)
- Full bill of materials
- Evaluation module (EVM) motherboard reference schematics
- JTAG diagnostics files (Annex A)

SDK

- AC6 Management Access Users Guide
- AC6 management presentation
- Management port interface example code
- Description and example code source files

Software

- OAM code module
- AC6 software release notes
- Modem diagnostic code module
- Modem datapump code

As a TI customer you can also expect full marketing support, engineering support from the field and factory including onsite application support for test and debug.

For More Information

If you would like more information on how you can launch your next DSL infrastructure design with the AC6, please contact your local TI field sales office or visit: **www.ti.com/ac6**

Devices in the Chipset

TNETD5800: Octal Transceiver

- Single chip integrates all digital functions for ADSL ATU-C modems, enabling maximum integration
- Supports:
  - Eight ADSL modems
  - ANSI T1.413, Issue 2, G.dmt, G.lite
  - Operation and Maintenance (OAM)
  - UTOPIA 2 asynchronous transfer mode (ATM) and synchronous serial mode
- Supports all standards-compliant forms of ADSL, including:
  - ITU G.992.1 (G.dmt)
  - ITU G.992.2 (G.lite)
  - ITU G.994.1 (G.hs)
  - ITU G.997.1 (G.ploam)
  - ANSI T1.413, Issue 2
- Optional in-band management eliminates need for local microcontroller
- Glueless interface:
  - TNETD5080 coder/decoder (codec)
  - Optional external microcontroller/processor (no real-time management functions required)
- On chip:
  - ARM processor and memory
  - Interleaving memory compliant to T1.413 and G.dmt standards
  - Per-modem built-in bit error-rate tester to simplify system test
- OAM register interface compatible with 4000C and AC5 for easy software migration
- Operating free-air temperature range -40°C to 85°C
- Packaged in a 305 thermally enhanced PBGA (1.0-mm pitch)

TNETD5082: Octal Integrated Codec

- Complete discrete multi-tone (DMT)-based ADSL AFE solution
- Supports up to eight independent channels
- Advanced system power control technique
- Each channel supports full rate and G.lite
- ADSL applications (both frequency overlapped and non-overlapped systems)
- Supports Annex A standards
- Integrated 14-bit converters for transmit (TX) and receive (RX)
- Integrated TX/RX digital filters
- Integrated programmable gain amplifier (PGA) for RX
- Integrated voltage reference
- High-speed serial interface for each channel
- One serial configuration port
- JTAG interface for production testing
- Sixteen general purpose outputs (GPO)
- Packaged in a 252 thermally enhanced PBGA (1.0-mm pitch)
- -40°C to 85°C operation

TNETD7112 ADSL Dual-Line Driver and Receiver

- Supports dual-channel operation
- Active termination differential line drivers
  - Eliminating line-matching resistors reduces output voltage and power consumption by up to 50 percent
- Integrated differential receivers
- Includes analog filters in both transmit and receive channels
- Multiple power saving modes
  - Bias current is adjustable in increments to allow lower power modes for short line lengths
- Packaged in 64-terminal plastic quad flat pack
- -40°C to 85°C operation

TI Worldwide Technical Support

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